

WHAT IS CLAIMED IS:

1. An automated slide loader cassette for a microscope comprising
- a slide cassette indexer for containing a plurality of microscope slides;
 - a slide exchange arm for gripping a microscope slide within said indexer and for transporting said slide to said microscope for observation and for transporting said slide after observation to return said slide back into said indexer; and
 - an XY-stage for moving said slide exchange arm between said indexer and said microscope.
- said indexer, said arm, and said XY-stage are connected together and integrated into one unitary modular instrument that can be moved from one microscope to another.
2. The automated slide loader cassette according to claim 1, comprising
- means for moving said slide cassette indexer along a

single vertical Z-axis along which is moved a slide cassette to a proper height for transfer of each slide; and

said slide cassette indexer being mounted to a common, stable base-plate.

3. The automated slide loader cassette according to claim 2, wherein said base-plate also supports the microscope so that the orientation of the slide cassette indexer and the microscope remains fixed; and

said means for moving said slide cassette indexer comprises a motor and a motor driven leadscrew with mechanical limits at either end of travel of said slide cassette indexer.

4. The automated slide loader cassette according to claim 1, further comprising

means for temporarily mounting the XY-stage to the microscope so that there is no interference with any optical operation of the microscope; and

means for moving said XY-stage in an X-axis direction and means for moving the XY-stage in a Y-axis direction.

5. The automated slide loader cassette according to claim 1,
wherein the XY-stage has an integrated, spring loaded
slide retention³⁶ device that locates a slide at a fixed
position; and

said retention device being actively disengageable by
mechanical linkage when the XY-stage moves along X-axis
direction to a slide exchange position.

6. The automated slide loader cassette according to claim 1,
comprising

means for mounting the slide exchange arm to the XY-stage;
and

said slide exchange¹⁶ arm has a distal finger³⁸ that
manipulates the slide to remove said slide from (the cassette *indirect*)
and to transfer the slide into a proper position on the
XY-stage and subsequently to return the slide back into the
cassette_x *indirect*

7. The automated slide loader cassette according to claim 6,

wherein said slide exchange arm has means for moving said arm along a long travel axis that is parallel to the X-axis of the XY-stage; and said long travel axis is defined as the radius R-axis; and R-43

said slide exchange arm has means for moving said arm along a short lift travel axis that tilts said arm to completely disengage the slide; and this lift travel tilt axis is the T-axis. T-44

8. The automated slide loader cassette according to claim 7, wherein said T-axis has two defined positions which are engaged and disengaged;

said slide exchange arm being driven in the R-axis direction by a motor and a motor driven belt with end-limits; and

said T-axis movement of the slide exchange arm is actuated by mechanical linkage to coordinated motion from the XY-stage X-axis.

9. An automated slide loader cassette in combination with a

microscope comprising

a microscope for individually viewing a plurality of slides one at a time;

a slide cassette indexer for containing a plurality of microscope slides;

a slide exchange arm for gripping a microscope slide within said indexer and for transporting said slide to said microscope for observation and for transporting said slide after observation to return said slide back into said indexer;

an XY-stage for moving said slide exchange arm between said indexer and said microscope; and

a computer controller for controlling the XY-stage;

said indexer, said arm and said XY-stage are connected together and integrated into one unitary modular instrument that can be moved from one microscope to another.

10. The automated slide loader cassette combination according to claim 9, comprising

means for moving said slide cassette indexer along a single vertical Z-axis along which is moved a slide cassette to

a proper height for transfer of each slide; and

said slide cassette indexer being mounted to a common, stable base-plate.

11. The automated slide loader cassette combination according to claim 10,

wherein said base-plate also supports the microscope so that the orientation of the slide cassette indexer and the microscope remains fixed; and

said means for moving said slide cassette indexer comprises a motor and a motor driven leadscrew with mechanical limits at either end of travel of said slide cassette indexer.

12. The automated slide loader cassette combination according to claim 9, further comprising

means for temporarily mounting of the XY-stage to the microscope so that there is no interference with any optical operation of the microscope; and

means for moving said XY stage in an X-axis direction and a means for moving the XY-stage in a Y-axis direction.

13. The automated slide loader cassette combination according to claim 9,

wherein the XY-stage has an integrated, spring loaded slide retention device that locates a slide at a fixed position; and

said retention device being actively disengageable by mechanical linkage when the XY-stage moves along an X-axis direction to a slide exchange position.

14. The automated slide loader cassette combination according to claim 9, comprising

means for mounting the slide exchange arm to the XY-stage; and

said slide exchange arm has a distal finger that manipulates the slide to remove said slide from the cassette and to transfer the slide into a proper position on the XY-stage and subsequently to return the slide back into the cassette

15. The automated slide loader cassette combination according to claim 14,

wherein said slide exchange arm has means for moving said arm along a long travel axis that is parallel to the X-axis of the XY-stage; and said long travel axis is defined as the radius R-axis; and

said slide exchange arm has means for moving said arm along a short lift travel axis that tilts said arm to completely disengage the slide; and this lift travel tilt axis is the T-axis.

16. The automated slide loader cassette combination according to claim 15,

wherein said T-axis has two defined positions which are engaged and disengaged;

said slide exchange arm being driven in the R-axis direction by a motor and a motor driven belt with end-limits; and

said T-axis movement of the slide exchange arm is actuated by mechanical linkage to coordinated motion from the XY-stage X-axis.